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Nasales Verabreichungsgerät mit Zerstäuberdüse

Dispositif d'administration nasale avec buse de pulvérisation

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(56) References cited:

<b>WO-A-94/13347</b>	<b>FR-A- 2 739 294</b>
<b>FR-A- 2 764 807</b>	<b>US-A- 2 906 265</b>
<b>US-A- 5 152 752</b>	<b>US-A- 5 601 077</b>
<b>US-A- 5 961 489</b>	

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**Description****FIELD OF THE INVENTION**

[0001] The present invention generally relates to delivery systems for delivering substances such as drugs, vaccines and the like, and more specifically relates to a delivery device for delivering such substances intranasally, i.e., through the nose, including a spray nozzle for use with a prefilled drug container such as a syringe. In addition, the present invention relates to a nasal delivery device and more particularly to a removable spray nozzle for use with standard syringes.

**BACKGROUND OF THE INVENTION**

[0002] Many injectable drugs are packaged and distributed in hypodermic syringes that will eventually be used to administer the drug to the patient. The syringe is the low cost, efficient, sterile instrument of choice for delivering liquid drug through a hypodermic needle. The hypodermic syringe also can be an excellent storage device for drug placed in it by a pharmaceutical manufacturer or hospital pharmacy.

[0003] Syringes may also prove useful for distributing and administering drugs even where a hypodermic injection is not desired. Delivering a therapeutic liquid as a spray through the nasal passageway is preferred to deliver certain therapeutic liquids under certain conditions. There have been several proposed devices to make syringes useful as nasal sprayers.

[0004] U.S. Patent No. 5,601,077 to Imbert discloses a nasal syringe sprayer for discharging the liquid contents of the syringe in a spray through the nasal passages. However, the use of that device is limited to pre-stored, liquid stable drugs. That is, the sprayer of the patent cannot be used with drugs that need to be maintained in powder or lyophilized form and reconstituted just prior to intake. Additionally, the sprayer tip of that patent does not allow an individual to load the syringe with a liquid mediation from a standard vial since the nasal spray nozzle cannot be inserted into such vials to extract the contents of the vial for loading the syringe.

[0005] U.S. Patent No. 4,767,416 to Wolf et al. discloses a flexible, removable spray nozzle for a syringe. The spray nozzle may be attached directly to a luer fitting of a syringe or may be adapted to fit over and attached to a hypodermic needle secured to the luer fitting. In either case, the spray nozzle fits onto the syringe in order to prevent back flow and leakage of the liquid at the attachment of the spray nozzle to the syringe. One shortcoming of the device is that the nozzle does not prevent unpressurized liquid from flowing through the opening at the tip of the spray nozzle.

[0006] US-A-5 961 489 discloses a spray adapter which can be connected with a syringe. The adapter has a pair of spray nozzles for delivering the spray to both nostrils at a time.

[0007] WO 94 13347 shows a prefilled delivery apparatus with a syringe and a sterile sleeve for receiving the syringe. The apparatus is not adapted to deliver a drug nasally.

5 [0008] FR-A-2 739 294 discloses a nasal spray nozzle which can be attached to a drug container. Therefore the nozzle has a sleeve, it further comprises a part which is introduced into the nasal passage. A spray aperture is at the tip of the part. At the transition of the sleeve and  
10 the part a flange is arranged. The flange prevents over-insertion of the nozzle into the nasal passage. The flange is arranged in the middle of the nozzle.

[0009] FR-A-2 764 807 discloses a nasal delivery device consisting of a head having a spray aperture and a  
15 cap adapted to be pushed over the spray aperture. The cap comprises an open cylinder which encircles the spray aperture but leaves the tip of the spray aperture open. At the base of the cylinder a flange is arranged. The flange aligns the spray aperture and limits insertion  
20 thereof into the nasal passage. To use the nasal delivery device one inserts the spray aperture into the nasal passage and puts the flange against the upper lip to incline the device which also limits insertion of the spray aperture into the nasal passage.

25 [0010] In view of the shortcomings and drawbacks of currently available or proposed systems, it is desirable to provide a removable spray nozzle for use with hypodermic syringes that is easy to handle.

**SUMMARY OF THE INVENTION**

[0011] This object is solved according to the present invention with the features of claim 1.

[0012] Specifically, the invention is directed to a nasal  
35 delivery device having a removable spray nozzle adapted for delivering liquid substances such as a drug from a syringe to a nasal passage. The spray nozzle includes a plastic rigid cap having a spray aperture at one end of the nozzle for delivering the liquid substance to the nasal passage. The spray nozzle is attached to the syringe when delivery of the liquid substance will be sprayed into the nasal passage. The spray nozzle includes an internal valve that allows pressurized liquid substance to flow through the nozzle and out of the spray aperture while  
40 also preventing unpressurized liquid from flowing through the spray aperture.

[0013] The spray nozzle further has a flange to prevent an individual from over-inserting the nozzle into the nasal passage. The nozzle also includes a resilient, elongate sleeve extending from the nozzle that is received over an elongate barrel of the syringe. The elongate sleeve includes a flange at an end to aid a user in grasping the assembly and delivering the liquid from the syringe to the nasal passage.

[0014] The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiments. The drawings that accompany

the detailed description can be briefly described as follows.

#### BRIEF DESCRIPTION OF THE DRAWINGS

##### [0015]

Figure 1 is an exemplary perspective view of a nasal delivery device.  
 Figure 2 is a side elevation view of the nasal delivery device of Figure 1.  
 Figure 3 is a side elevation view of the nasal delivery device of Figure 1 viewed from the one end.  
 Figure 4 is a partial cross-sectional view of the nasal delivery device of Figure 3 taken along line 4-4.  
 Figure 5 is a cross-sectional view of the nasal delivery device of Figure 2 taken along line 5-5.  
 Figure 6 is an enlarged cross-sectional view of the spray nozzle of the nasal delivery device illustrating a two-component spray nozzle assembly having one-way valve features.  
 Figure 7 is an enlarged cross-sectional view of the spray nozzle illustrating a snap-fit feature.  
 Figure 8 is a side elevational view of a nasal delivery device designed according to this invention.  
 Figure 9 is a flow chart diagram schematically illustrating a method of filling a device designed according to this invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Figures 1-6 illustrate the basic features of the nasal delivery device of the present invention generally designated 20 including a drug container such as a standard syringe and a separable spray nozzle 37 attachable thereto. The syringe has an elongated barrel 21 having an open proximal end 22, a chamber 23 for retaining liquid and a tip portion 25 extending from a distal end 27 of the barrel 21. A passageway 28 extends through the tip portion 25 between the chamber 23 and an opening in the end of the tip portion.

[0017] For the purposes of this description, the term "distal end" is used to refer to the end furthest from the person holding the nasal delivery device and the term "proximal end" is meant to refer to the end closest to the holder of the nasal delivery device.

[0018] A stopper 29 is slidably positioned in fluid-tight engagement inside barrel 21 and is connected to an elongate plunger rod 31 in a conventional manner. The plunger rod 31 projects proximally from the stopper 29 and extends outwardly from the open proximal end 22 of the barrel 21. The plunger rod 31 is accessible outside of the proximal end of the barrel and is provided to move the stopper 29 along the barrel 21 to force liquid out of the chamber 23 through the passageway 28. A disc-shaped plunger rod flange 32 on the proximal end of the plunger rod 31 provides a convenient structure for ap-

plying forces to move the plunger rod 31 with respect to the barrel 21. The large surface area of the flange 32 reduces the pressure on a user's fingers while delivering the substance such as a drug, vaccine or the like through the nasal delivery device.

[0019] A therapeutic liquid such as liquid substance 35 is contained within the chamber 23. The syringe can be prefilled or manually filled by an end user as needed. An example method of prefilling is discussed below in connection with Figure 9. In the event that the user fills the syringe, that should be completed before the spray nozzle 37 is in place.

[0020] In order to deliver the liquid substance 35 to the nasal passage of a user, the separable spray nozzle 37 slides onto the tip 25 of the syringe 20. The internal surface of the spray nozzle 37 defines a conduit 39 that is in fluid communication with the passageway 28 when placed on the syringe. The spray nozzle 37 also includes a distal end 40 having a spray aperture 41 in fluid communication with conduit 39.

[0021] The spray nozzle 37 preferably includes two main components; a generally rigid plastic cap 38 and a generally flexible valve 45. The cap 38 preferably is constructed of a polymer, such as polypropylene, and is configured to be slidably mounted onto the tip portion 25 of the barrel 21 of the syringe. A conventional luer tip arrangement between the tip portion 25 and a cooperating opening 44 of the cap 38 secure the cap 38 in place.

[0022] A variety of cap openings and tip configurations can be used. It is useful to use tip designs that differ from conventional syringes when it is important to ensure that a standard hypodermic needle will not be used with a syringe body intended for use with the spray nozzle 37 of the present invention.

[0023] The valve 45 preferably is contained within the cap 38 between the tip portion 25 and the distal end 40 of the cap 38. The valve 45 interacts with the internal surface of cap 38 to allow only pressurized liquid to flow distally through the spray aperture 41. The valve 45 prevents unpressurized liquid in the chamber 23 from flowing through the aperture 41. Therefore, a mist of liquid rather than a stream or drops are expelled from the outlet 41.

[0024] The valve in one preferred embodiment is a skirt valve having a circumferential skirt 46 that will partially collapse or move away from the internal sidewall under the force of pressurized liquid from the chamber 23 to allow the liquid to flow from the syringe through the spray aperture 41. The skirt 46 collapses by moving away from the interior side wall of the cap 38 allowing liquid to pass through the gap, which is created by hydraulic pressure, between the skirt 46 and the cap 38. Since the skirt 46 is normally biased into engagement with the internal sidewall and only flexes in one direction, it ensures that no fluid flows in a backward direction through the cap. A wide variety of materials such as natural rubber, synthetic rubber and thermoplastic elastom-

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ers are suitable for forming the flexible valve 45 with thermoplastic elastomers being preferred.

**[0025]** The spray nozzle 37 includes a flange 43 at one end of the cap 38. Flange 43 acts as a depth limiter to prevent over-insertion of the nozzle 37 into the nasal passage.

**[0026]** As shown in Figure 7, the spray nozzle 37 may be configured so that it may not be removed from the syringe. In this embodiment, the tip 25 of the syringe has a groove 60 that preferably extends circumferentially around the tip portion adjacent the syringe body. Cooperating opening 44 has a corresponding undercut 62 that forms a flange so that when the cap 38 is slid onto the tip 25, a snap-fit between the flange and groove effectively permanently secures the nozzle 37 to the syringe. The valve 45 is not illustrated in Figure 7 for simplification. A valve is included to ensure that a mist or spray is delivered into a nasal passage.

**[0027]** In some instances, it is useful to permit some flow back into the syringe through the spray nozzle. For example, Figure 7 includes a modified valve 45' that has at least one passage 46a through the skirt 46. This passage allows fluid to be drawn into the syringe when using an appropriately configured vial adapter.

**[0028]** As best seen in Figures 2, 4 and 5, a dosage limiter 47 can be employed. The limiter 47 partially surrounds the plunger rod 31 so that the limiter 47 will not fall off the plunger rod 31 under its own weight but may be forcibly removed from the plunger rod 31 without eliminating the ability of the nasal delivery device to deliver the substance from the chamber through the aperture 41. The limiter 47 may be designed with a thin cross-section so that it will deflect and snap over the plunger rod 31 or the plunger rod 31 may be designed to deflect under the forces of the limiter 47 during attachment or removal. Alternatively, both elements may be designed to deflect partially during installation and removal of the limiter 47. A finger tab portion 49 facilitates installation and removal. A plurality of ribs 50 provide a better grip.

**[0029]** The limiter 47 is adapted to interact between a radially extending projection on the plunger rod 31 such as flange 32 and proximal end 22 of the barrel 21 which includes a barrel flange 26 to limit the distal motion of the plunger rod with respect to the barrel 21. For example, the length of the limiter 47 can correspond to one-half of the volume of liquid substance in the chamber 23, which proves useful to deliver equal doses into each nostril.

**[0030]** In use, the nasal delivery device can be inserted into one nostril of the user while it is fully loaded such as illustrated in Figure 4. Pressure on the plunger rod flange 22 in a distal direction (i.e., right to left according to the drawing) will cause the liquid substance 35 to flow through the passageway 28 into the conduit 39 of the cap 38, deflecting the skirt portion 46 of the flexible valve 45, and through the spray aperture 41. The plunger rod 31 can be moved until further distal motion is prevented

by contact of the plunger rod flange 32 with limiter 47 which, in turn, contacts barrel flange 26. The plunger rod 31 can no longer be moved in a distal direction and approximately one-half of the liquid substance still remains in the syringe.

**[0031]** The user then removes the nasal delivery device from one nostril, pulls the limiter 47 off the plunger rod 31 and prepares to deliver a dose to the other nostril. With the limiter 47 now removed, the nasal delivery device may now be placed so that the spray nozzle is in the other nostril and the remaining half of the liquid substance 35 may be delivered.

**[0032]** The nasal delivery device 55 according to the invention is illustrated in Figure 8. The structure of the nasal delivery device is substantially similar to the nasal delivery device shown in Figures 1-7. Accordingly, substantially similar components that perform substantially similar functions will be numbered identically to the components of the embodiment of Figures 1-7 except a suffix "a" will be used to identify those components in Figure 8.

**[0033]** According to the invention, the spray nozzle 37 preferably includes a generally resilient, elongate sleeve member 64 extending from the cap 38a. Elongate sleeve member 64 includes two finger-like portions 66, as shown in Figure 8. A flange 68 provides an increased surface area to aid a user in delivering the liquid from the syringe to the nasal passage. The increased surface area is more easily retained against an individual's index and fore fingers than the typical end 22a of the syringe body. Additionally, pressure from the individual's fingers serves to maintain the nozzle 37 on the syringe.

**[0034]** The nasal delivery device shown in Figure 8 includes a valve member in the cap portion 38a as described above to ensure a spray or mist delivery. The adapter 37a can include the snap fit shown in Figure 7.

**[0035]** There are several advantages provided by the present invention. The inventive arrangement having a nasal sprayer adapter can be used to deliver the substance that is targeted for nasal delivery but is not liquid-stable and, therefore, needs to be stored in powder or lyophilized form in a separate, appropriate vial. Other nasal delivery device devices that do not have a cap like that of this invention cannot accommodate such substances.

**[0036]** Less water vapor is lost from a syringe that works with the inventive adapter since the plastic cap need not be permanently attached to the syringe prior to use. Additionally the likelihood for pressure valve activation during plunger rod assembly and handling is lessened since the spray nozzle need not be attached to the syringe until it is ready for use. Furthermore, stability testing regarding compatibility issues is simplified since the plastic spray nozzle does not interfere with the liquid substance over a long period of time.

**[0037]** The advantages provided by this invention render it more useful for use with prefilled syringes. One

method of prefilling syringes to be used as a nasal delivery device is schematically shown in flow chart form in Figure 9.

**[0038]** A supply of syringe barrels 200 includes the desired form of syringe, such as those illustrated and discussed above. A locally controlled environment 202 preferably is maintained in a known manner. The locally controlled environment 202 preferably is situated to immediately accept the syringes without requiring any intermediate cleaning or sterilizing steps between the supply 200 and the environment 202.

**[0039]** In one example, the syringe barrels are washed with air at 204 to remove any particulates from the syringes. The syringes preferably are then coated at 206 with a lubricant such as a lubricating silicone oil on the inner surface. The lubricant facilitates moving the stopper 29 and plunger rod 31 through the syringe during actual use of the device.

**[0040]** The end of syringes that eventually receive the spray nozzle may be capped with a tip cap within the environment 202. In one example, tip caps are supplied at 208. The tip caps are air washed at 210. The cleaned tip caps and syringe barrels are conveyed to an assembly device 212 where the tip caps are secured onto the syringes. The syringe barrel assemblies are then conveyed to a filling station 214 to be filled with the desired substance.

**[0041]** Once filled as desired, the stoppers 29 are inserted into the open end of the syringes at 220. Prior to inserting the stoppers 29, they preferably are assembled with the plunger rods 31 at 222 and lubricated at 224 with a conventional lubricant in a known manner. The assembled, filled syringes preferably are inspected at 226 for defects and discharged from the locally controlled environment.

**[0042]** The syringes typically will be sterilized at 230 and packaged at 232 into individual packages or into bulk packaging depending on the needs of a particular situation. Suitable sterilization techniques are known and will be chosen by those skilled in the art depending on the needs of a particular situation or to accommodate the properties of a given substance. Sterilizing a device designed according to this invention can be completed before or after packaging.

**[0043]** Variations of the filling steps are possible. For example, the stopper can be inserted first, then fill the syringe, followed by applying a tip cap.

**[0044]** The actual insertion of the desired substance can be accomplished in any of several known manners. Example filling techniques are disclosed in U.S. Patent Nos. 5,620,425 to Hefferman et al.; 5,597,530 to Smith et al.; 5,537,042 to DeHaen; 5,531,255 to Vacca; 5,519,984 to Veussink et al.; 5,373,684 to Veussink et al.; 5,265,154 to Liebert et al.; 5,287,983 to Liebert et al.; and 4,718,463 to Jurgens, Jr. et al.

**[0045]** The description just given is exemplary rather than limiting in nature. Variations and modifications may become apparent to those skilled in the art that do not

necessarily depart from the basis of this invention as defined by the following claims.

## 5 Claims

1. A nasal spray nozzle for use with a drug container such as a syringe for delivering liquid substances (35) such as drugs, vaccines and the like into a nasal passage, comprising:

a rigid cap body (38) having a conduit (39) extending between a spray aperture (41) at one end (40) and an opening at a second end that is adapted to be attached to a syringe containing the substance (35) for delivering the substance (35) to the nasal passage; and

an internal valve (45) supported within the conduit (39) between the spray aperture (41) and the opening, the valve (45) only allowing the substance (35) to flow through the spray aperture (41) under pressure such that a spray mist of substance (35) is delivered from the spray aperture (41);

**characterized in that** a flange (43) extends radially outward from the cap body (38) near the opening, said flange (43) extending outwardly further than the remaining exterior of the cap body (38) for limiting insertion of the remaining exterior of the cap body (38) into the nasal passage; and  
that the cap body (38) includes a sleeve (64) that is generally cylindrical and is annularly continuous, wherein the sleeve (64) has two generally arcuate sidewall portions (66) that are spaced apart from each other.

2. The spray nozzle as recited in claim 1 wherein the valve (45) includes a generally flexible member (46) supported within the cap body (38) that is biased into engagement with the internal surface of the cap body (38) such that only pressurized substance (35) flows past the flexible member (46) and toward the spray aperture (41) in a single direction.
3. The spray nozzle as recited in claim 1, wherein the valve (45) is integrally formed within the cap body (38) and includes a flexible member (46) that is biased to close off the conduit (39) such that only pressurized substance (35) flows past the flexible member (46) in a single direction toward the spray aperture (41).
4. The spray nozzle as recited in claim 1 wherein the flange (43) is adapted to accommodate a finger of a user to facilitate grasping the cap body (38) and delivering the substance (35) from the syringe to the

nasal passage.

5. The spray nozzle of one of claims 1 to 4, wherein the external dimension of the cap body (38) near the opening is smaller than the external dimension of the sleeve (64) to prevent over-insertion of the cap body (38) into the nasal passage.
10. The spray nozzle of one of claims 1 to 5, wherein a flange (68) of the sleeve (64) provides an increased surface area to aid the user in delivering the liquid from the syringe to the nasal passage.

#### Patentansprüche

1. Nasalzerstäuberdüse zur Verwendung mit einem Medizinbehälter wie einer Spritze zum Ausgeben von flüssigen Substanzen (35) wie Medikamente, Impfstoffe und dergleichen in eine Nasenhöhle, mit:

- einem starren Kappenkörper (38) mit einer Leitung (39), die sich zwischen einer Zerstäuberöffnung (41) an einem Ende (40) und einer Öffnung an einem zweiten Ende erstreckt, welche an einer die Substanz (35) enthaltenden Spritze zum Ausgeben der Substanz (35) in die Nasenhöhle anbringbar ist, und
- einem inneren Ventil (45), das in der Leitung (39) zwischen der Zerstäuberöffnung (41) und der Öffnung gestützt ist, wobei das Ventil (45) das Fließen der Substanz (35) durch die Zerstäuberöffnung (41) nur unter Druck ermöglicht, so daß ein Sprühnebel der Substanz (35) aus der Zerstäuberöffnung (41) ausgegeben wird;

#### dadurch gekennzeichnet, daß

- ein Flansch (43) sich nahe der Öffnung von dem Kappenkörper (38) radial nach außen erstreckt, wobei der Flansch (43) sich weiter nach außen erstreckt als die übrige Außenseite des Kappenkörpers (38), um das Einführen der übrigen Außenseite des Kappenkörpers (38) in den Nasenhohlraum zu begrenzen; und
  - der Kappenkörper (38) eine Hülse (64) aufweist, die im wesentlichen zylindrisch und ringförmig durchgehend ist, wobei die Hülse (64) zwei im wesentlichen bogenförmige Seitenwandbereiche (66) aufweist, die voneinander beabstandet sind.
2. Zerstäuberdüse nach Anspruch 1, bei der das Ventil (45) ein im wesentlichen flexibles Teil (46) aufweist, das in dem Kappenkörper (38) gestützt ist und ge-

gen die Innenseite des Kappenkörpers (38) derart vorgespannt ist, daß nur druckbeaufschlagte Substanz (35) an dem flexiblen Teil (46) vorbei und in einer einzigen Richtung zur Zerstäuberöffnung (41) fließt.

3. Zerstäuberdüse nach Anspruch 1, bei der das Ventil (45) einstückig in dem Kappenkörper (38) ausgebildet ist und ein flexibles Teil (46) aufweist, das zum Verschließen der Leitung (39) derart vorgespannt ist, daß nur druckbeaufschlagte Substanz (35) an dem flexiblen Teil (46) vorbei und in einer einzigen Richtung zur Zerstäuberöffnung (41) fließt.

15. 4. Zerstäuberdüse nach Anspruch 1, bei der der Flansch (43) zur Aufnahme eines Fingers eines Benutzers angepasst ist, um das Ergreifen des Kappenkörpers (38) und das Ausgeben der Substanz (35) aus der Spritze in den Nasenhohlraum zu erleichtern.

20. 5. Zerstäuberdüse nach einem der Ansprüche 1 bis 4, bei der die Außenabmessung des Kappenkörpers (38) nahe der Öffnung kleiner als die Außenabmessung der Hülse (64) ist, um ein übermäßiges Einführen des Kappenkörpers (38) in den Nasenhohlraum zu verhindern.

25. 6. Zerstäuberdüse nach einem der Ansprüche 1 bis 5, bei der ein Flansch (68) der Hülse (64) eine vergrößerte Fläche aufweist, um den Benutzer beim Ausgeben der Flüssigkeit aus der Spritze in den Nasenhohlraum zu unterstützen.

#### Revendications

30. 1. Buse de pulvérisation nasale utilisable avec un réservoir pour produits médicamenteux, tel qu'une seringue, afin d'administrer des substances liquides (35), telles que des produits médicamenteux, des vaccins et analogues, dans un conduit nasal, comprenant:

40. 45. un corps en forme de capuchon (38), rigide, présentant, un passage (39) qui s'étend entre un orifice de pulvérisation (41), à une extrémité (40), et une ouverture à une seconde extrémité, qui est adaptée de façon à être fixée à une seringue contenant la substance (35) en vue de l'administration de la substance (35) au conduit nasal; et

50. 55. une soupape interne (45) supportée à l'intérieur du passage (39) entre l'orifice de pulvérisation (41) et l'ouverture, la soupape (45) permettant seulement à la substance (35) de s'écouler sous pression à travers l'orifice de pulvérisation (41) de telle manière qu'un jet atomisé de subs-

tance (35) soit délivré à partir de l'orifice de pulvérisation (41);

**caractérisée en ce qu'une collerette (43)**  
s'étend radialement vers l'extérieur depuis le corps  
en forme de capuchon (38) à proximité de l'ouverture,  
ladite collerette (43) se projetant plus loin vers  
l'extérieur que la partie extérieure restante du corps  
en forme de capuchon (38) pour limiter l'introduction  
de la partie extérieure restante du corps en forme  
de capuchon (38) dans le conduit nasal; et  
**en ce que** le corps en forme de capuchon (38)  
comporte un fourreau (64) qui est de forme générale  
cylindrique et est annulairement continu, le  
fourreau (64) possédant deux tronçons de paroi latérale (66) de forme générale arquée, qui sont espacés l'un de l'autre.

2. Buse de pulvérisation selon la revendication 1, dans laquelle la soupape (45) comporte un élément flexible dans son ensemble (46), supporté à l'intérieur du corps en forme de capuchon (38), qui est sollicité de façon à être en contact avec la surface interne du corps en forme de capuchon (38) afin que seule une substance (35) mise sous pression s'écoule au-delà de l'élément flexible (46) et en direction de l'orifice de pulvérisation (41), dans un seul sens. 20
3. Buse de pulvérisation selon la revendication 1, dans laquelle la soupape (45) est formée d'un seul tenant à l'intérieur du corps en forme de capuchon (38) et comporte un élément flexible (46) qui est sollicité de façon à obturer le passage (39) afin que seule une substance (35) mise sous pression s'écoule dans un seul sens au-delà de l'élément flexible (46), en direction de l'orifice de pulvérisation (41). 30
4. Buse de pulvérisation selon la revendication 1, dans laquelle la collerette (43) est adaptée pour recevoir un doigt d'un utilisateur, de façon à faciliter la prise du corps en forme de capuchon (38) et l'administration de la substance (35) au conduit nasal à partir de la seringue. 40
5. Buse de pulvérisation selon l'une des revendications 1 à 4, dans laquelle la dimension externe du corps en forme de capuchon (38), à proximité de l'ouverture, est inférieure à la dimension externe du fourreau (64), afin d'empêcher que le corps en forme de capuchon (38) soit introduit trop profondément dans le conduit nasal. 50
6. Buse de pulvérisation selon l'une des revendications 1 à 5, dans laquelle une collerette (68) du fourreau (64) présente une surface d'aire agrandie, afin d'aider l'utilisateur dans l'administration du liquide 55

au conduit nasal à partir de la seringue.

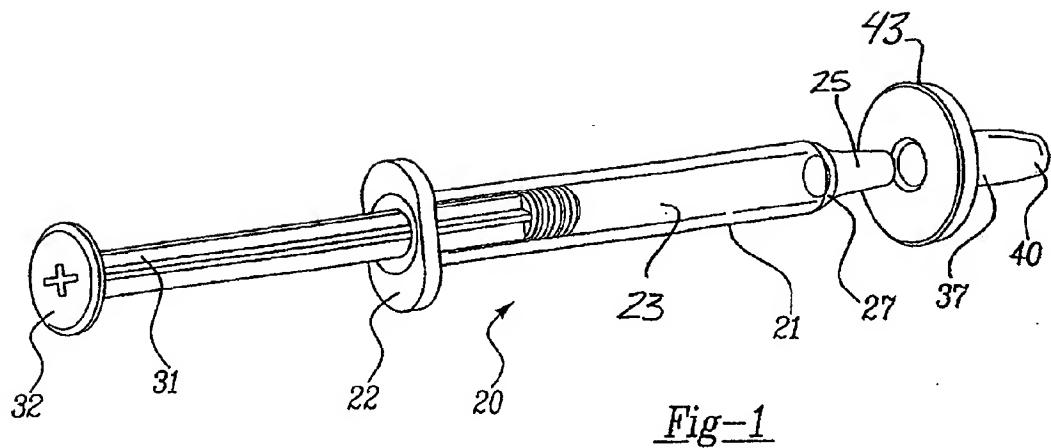


Fig-1

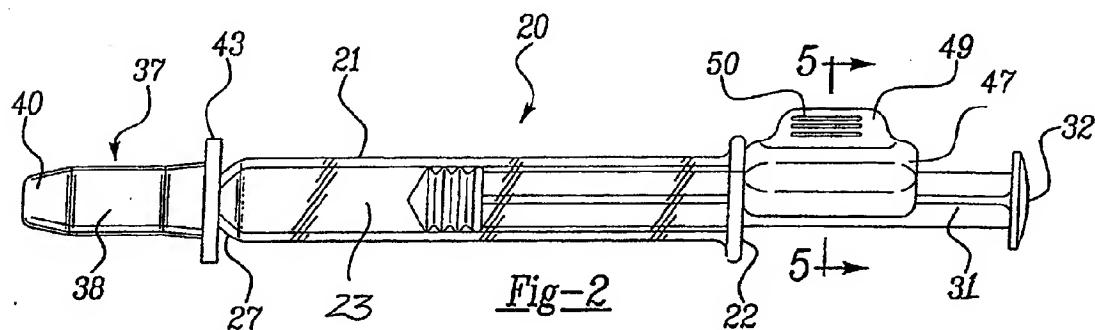


Fig-2

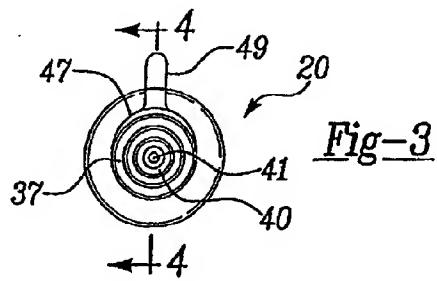


Fig-3

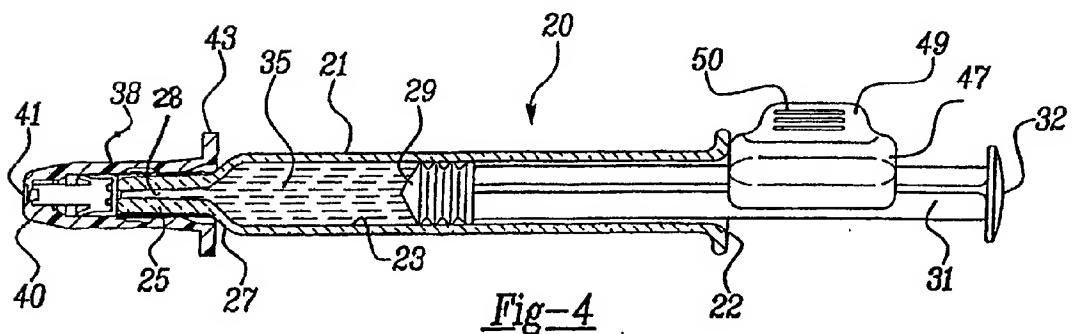
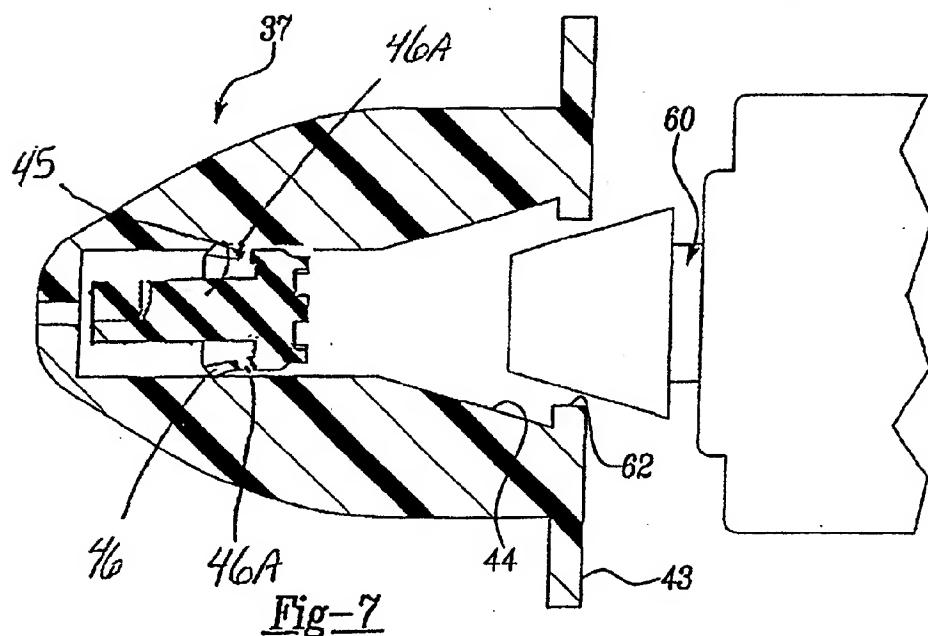
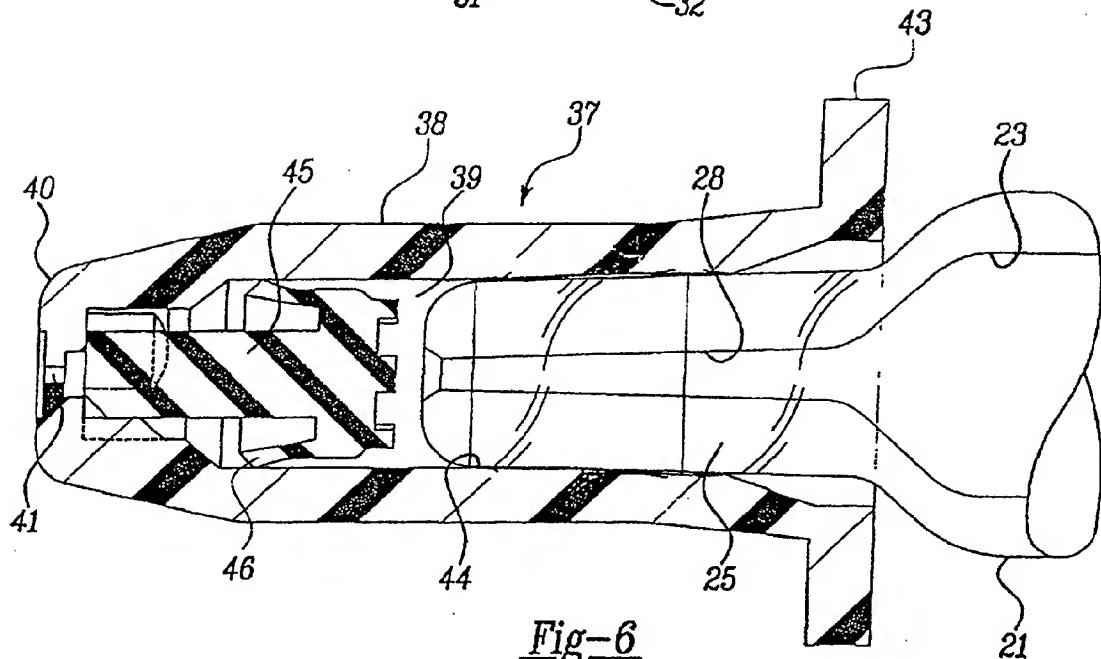
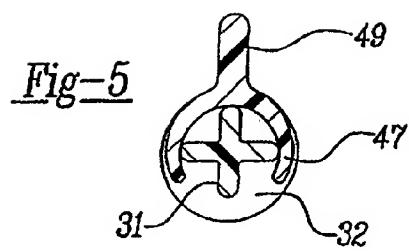


Fig-4



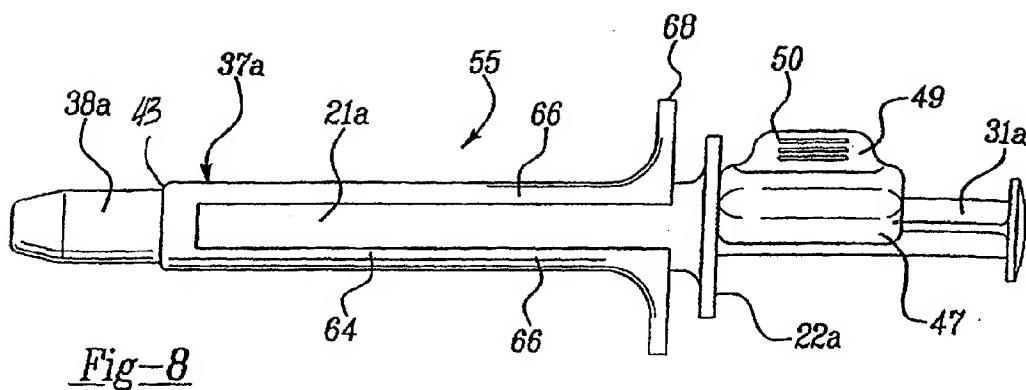


Fig 9

